

CLAIMS

We claim:

1. A method of enabling remote monitoring of a Foundation Fieldbus standard
5 compliant digital local process network by a remote user of a remote host node in a network environment including a plurality of process devices and a local host node residing on the digital local process network, the remote host node being connectable to the local host node via a wide area network, the method comprising the steps of:
 - invoking execution of a browser on the remote host node;
 - 10 loading a web page via the browser, the web page containing an applet identifier;
 - executing on the remote host node an applet corresponding to the applet identifier, wherein the applet is adapted when executed to establish communication between the remote host node and the local host node via the wide area network;
 - transmitting at least one signal from the remote host node to the local host node,
- 15 wherein the at least one signal is constructed to cause the local host node to invoke execution of a servlet on the local host node, and further to cause the servlet to receive process data via a Foundation Fieldbus communication stack Fieldbus Messaging Specification layer from at least one of the plurality of process devices and to transmit the received process data to the remote host node via the wide area network and the applet;
- 20 and
 - conveying information representative of the process data to the remote user of the remote host node via the browser.

2. The method according to claim 1, wherein the wide area network is the Internet.

3. The method according to claim 1, wherein the servlet is a Java servlet and the Applet is a Java applet.

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4. The method according to claim 1, wherein the step of conveying information representative of the process data to the remote user comprises the step of displaying process data from two of the plurality of process devices.

10 5. The method according to claim 1, wherein the process data is selected from the group consisting of device information, device status information, and a process parameter.

15 6. The method according to claim 1, further comprising the step of inspecting a time stamp at the applet, wherein the time stamp is associated with the transmitted process data, to determine whether the transmitted process data is timely.

20 7. The method according to claim 1, further comprising the steps of;
determining whether a transmission has been received by the applet from the servlet within a predetermined check time period;
transmitting a first probe message from the applet to the servlet if it is determined that a transmission has not been received by the applet from the servlet within the predetermined check time period; and

determining whether a response to the first probe message has been received by the applet from the servlet within a predetermined time-out period.

8. The method according to claim 7, further comprising the steps of:

5 transmitting a second probe message from the applet to the servlet if it is determined that a response to the first probe message has not been received by the applet from the servlet within a predetermined time-out period;

determining whether a response to the second probe message has been received by the applet from the servlet within a second predetermined time-out period;

10 transmitting a third probe message from the applet to the servlet if it is determined that a response to the second probe message has not been received by the applet from the servlet within the second predetermined time-out period;

determining whether a response to the third probe message has been received by the applet from the servlet within a third predetermined time-out period; and

15 determining that network connectivity between the servlet and the applet does not exist if it is determined that a response to the third probe message has not been received by the applet from the servlet within the third predetermined time-out period.

9. The method according to claim 1, wherein the process data is associated with 20 hyperlink data specifying a second web page, the method further comprising the steps of:
reading the hyperlink data by the browser;
accessing by the browser the second web page; and

conveying by the browser to the remote user information corresponding to the second web page.

10. The method according to claim 9, wherein the second web page contains
5 maintenance information regarding one of the plurality of process devices.

11. The method according to claim 1, wherein the step of conveying information representative of the process data to the remote user comprises the step of causing an audible indication to be directed to the remote user.

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12. A method of enabling remote monitoring of a Foundation Fieldbus standard compliant digital local process network by a remote user in a network environment including a plurality of process devices and a local host node residing on the digital local process network and a remote host node connectable to the local host node via a wide area network, the method comprising the steps of:
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receiving at the local host node over the wide area network at least one transmission from an applet running on the remote host node;
invoking execution of a servlet on the local host node pursuant to instructions in the at least one transmission, wherein the servlet resides in an application layer over a

20 Foundation Fieldbus standard communications stack having a Fieldbus Messaging Specification layer;

obtaining by the servlet process information from at least one of the plurality of process devices, by causing the servlet to communicate with the at least one of the plurality of process devices via the Fieldbus Messaging Specification layer; and

transmitting the process information over the wide area network by the servlet to

- 5 the applet, pursuant to instructions in the at least one transmission, whereby a representation corresponding to the process information is conveyed by the remote host node to a remote user.

13. The method according to claim 12, wherein the wide area network is the Internet.

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14. The method according to claim 12, wherein the step of transmitting process information further comprises the step of transmitting hyperlink data, whereby the browser uses the hyperlink data to access a second web page containing maintenance information regarding one of the plurality of process devices.

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15. The method according to claim 12, wherein the servlet is a Java servlet and the Applet is a Java applet.

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16. The method according to claim 12, wherein the step of causing the servlet to obtain process information comprises the step of causing the servlet to obtain process information from two of the plurality of process devices.

17. The method according to claim 16, wherein the process information is selected from the group consisting of device information, device status information, and a process parameter.

5 18. The method according to claim 12, wherein the step of transmitting the process information over the wide area network further comprises the step of associating a time stamp with the process information, wherein the time stamp is usable to determine the timeliness of the process information.

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10 19. A servlet for residing in a user application layer on a node of a Foundation Fieldbus standard compliant digital local process network to interface the local process network to a remote wide area network node, wherein the local process network comprises a physical layer, the servlet comprising:
a communications interface to the wide area network, for sending transmissions to and receiving transmissions from an applet residing on the remote wide area network node; and
an interface between the user application layer and a Foundation Fieldbus standard compliant Fieldbus Messaging Specification layer communicably linked to the physical layer, for sending transmissions to and receiving transmissions from any of a plurality of process devices residing on the local process network, whereby the servlet receives instructions over the wide area network from the applet residing on the remote wide area network node to collect information from any of the plurality of process devices for transmission to the applet over the wide area network.

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20. The servlet according to claim 19 wherein the wide area network is the Internet.
21. An applet for running on a first node of a wide area network to interface the first
5 node to a Foundation Fieldbus standard compliant digital process network over the wide
area network, the applet comprising:
- a communications interface to the wide area network, for sending transmissions to
and receiving transmissions from a servlet residing on a second node on the wide area
network, the second node being communicably linked to the process network, wherein
10 the servlet resides in an application layer over a Foundation Fieldbus standard
communications stack, and wherein the servlet interfaces with the Foundation Fieldbus
standard communications stack via a Fieldbus Messaging Specification layer within the
Foundation Fieldbus standard communications stack; and
- an interface to a browser running on the first node, for sending information to the
15 browser for display to a user and for receiving information representative of user input,
whereby the applet receives instructions from the user and in keeping therewith sends a
transmission via the wide area network to the servlet, the transmission constructed to
cause the servlet to selectively collect information from any of a plurality of process
devices residing on the process network and to transmit the collected information to the
20 applet for display to the user.
22. The applet according to claim 21, wherein the wide area network is the Internet.

23. The applet according to claim 21, wherein the collected information is selected from the group consisting of device information, device status, and a process parameter.

24. The applet according to claim 22, wherein the applet is a Java applet and the
5 servlet is a Java servlet.

25. A method of enabling remote interaction with a Foundation Fieldbus standard compliant digital local process network by a remote user of a remote host node, in a network environment including a plurality of process devices and a local host node residing on the digital local process network, the remote host node being connectable to the local host node via a wide area network, the method comprising the steps of:

invoking execution of a browser on the remote host node;

loading a web page via the browser, the web page containing an applet identifier;

executing on the remote host node an applet corresponding to the applet identifier,

15 wherein the applet is adapted when executed to establish communication between the remote host node and the local host node via the wide area network; and

transmitting at least one signal from the remote host node to the local host node,

wherein the at least one signal is constructed to cause the local host node to invoke

execution of a servlet residing in an application layer on the local host node, and further

20 to cause the servlet to transmit information to at least one of the plurality of process devices via the Fieldbus Messaging Specification layer of a Foundation Fieldbus standard communications stack.

26. The method of claim 25, wherein the information transmitted by the servlet to the at least one process device comprises mode information to effect a mode change in the at least one process device.

5 27. The method of claim 25, wherein the information transmitted by the servlet to the at least one process device comprises program information to effect loading of an executable program onto the at least one process device.

10 28. The method of claim 25, wherein the information transmitted by the servlet to the at least one process device further comprises a command to invoke execution of an executable program.

15 29. The method of claim 25, wherein the information transmitted by the servlet to the at least one process device comprises a request for the at least one process device to send data to the servlet.